ESTIMATED TIME SCHEDULE FOR OU-2 GROUNDWATER MODELING

The following schedule is anticipated for the groundwater modeling work to support the OU-2 Human Health Risk Assessment for the RFI/RI Report, and to support the OU-2 feasibility study to be performed later. The scope of the modeling work was developed in numerous meetings with EG&G and DOE staff. The use of MODFLOW and MT3D for the OU-2 modeling work has been proposed to EPA/CDH in the modeling technical memorandum submitted in January 1993. EG&G modeling personnel have been involved in the development of the modeling work scope and in ongoing review of the modeling progress.

The following schedule is anticipated (or has been completed) for the groundwater modeling work:

Fall 1992

Development of the modeling approach, selection of modeling codes, preparation of the modeling technical memorandum. Development of the groundwater modeling conceptual model of the physical system. Preparation of graphics (CAD) files for various geologic surfaces (e.g., top of bedrock, topography, No. 1 Sandstone channel, alluvial groundwater level).

January 4 - 12, 1993

In December 1992, DOE instructed W-C to begin MODFLOW numerical model set-up prior to agency approval of modeling technical memorandum (agency approval was still pending as of February 15, 1993). Work conducted during this period consisted of preparation of MODFLOW input files using CAD, CPS, and FAST-LOOK computer programs (i.e., pre- and post-processor tool development).

January 13 - February 8, 1993

Steady-state calibration of the MODFLOW model. Initial objectives were to 1) calibrate an initial water table for the transient simulations, and 2) obtain quasi-transient results by simulating steady-state conditions under high and low flow conditions to evaluate potential for limiting modeling to steady-state simulations only.

Calibration of steady-state model required iterative adjustment of numerous input files including:

- Top of bedrock surface
- Thickness of No. 1 Sandstone channel
- Topographic surface
- May and March water levels in alluvium and No. 1 Sandstone
- Subcropping sandstone map
- Areal recharge distribution
- Hydraulic conductivity distribution
- Vertical conductance distribution

- Alluvial and bedrock seep distribution and values

Complexities encountered during calibration of the steady-state model included:

1) The physical setting of the hydrogeologic system at OU-2 is highly complex, consisting of a narrow, sinuous alluvial groundwater system dominated by a paleovalley incised on the top of bedrock, and an underlying sandstone channel groundwater system which is in partial communication with the alluvium on a transient basis.

2) The actual groundwater system is highly transient due to dependence on highly variable areal recharge as primary recharge source, and transient nature of alluvium / sandstone interaction.

3) The high variation in observed water levels during the year poses substantial numerical problems for MODFLOW due to cyclical dewatering and rewetting of model cells.

These complexities resulted in numerous numerical and other calibration problems, and required iterative modification of a number of the MODFLOW files. Based on meetings with EG&G modeling personnel (Barry Roberts), it was decided that the steady-state calibration process had demonstrated that the OU-2 hydrogeologic system could not reasonably be simulated by a steady-state model. Based on this conclusion, it was decided work should proceed on the transient calibration.

February 9 - 19, 1993

Work on the transient flow model began. Initial calibration approach is to simulate 3-season system from high flow (May) to low flow season (March) (i.e., simulate drop in water levels) to avoid numerical complexity of rewetting model cells. Simulation of rising water levels will be performed later. Reasonable ranges for storage coefficient were developed. Additional pre- and post-processor work was conducted to support the transient calibration.

February 20 - March 5, 1993

Work on the 3-season transient calibration will continue. Calibration will involve iterative adjustment of the following input files:

- Hydraulic conductivity distribution
- Storage coefficient distribution
- Vertical conductance distribution (temporal and areal)
- Seepage (drain cell) value distribution (temporal and areal)
- Areal recharge distribution (temporal and areal)

March 6 - March 19, 1993

Begin 4-season transient calibration to simulate rising and falling water levels. This process will involve the use of the new BCF2 module for MODFLOW to simulate rewetting of model cells.

It is expected that rewetting of model cells will cause substantial numerical problems which will have to be overcome. Calibration will require further iterative adjustment of model input files.

March 20 - April 2, 1993

The 4-season transient calibration will be completed. Statistical analysis of calibration results will include residual analysis and flux analysis. Graphical presentations will be prepared including hydraulic head maps, hydrographs, and wet and dry area maps.

April 5 - 16, 1993

Sensitivity analyses will be performed to evaluate model sensitivity to storage coefficient, hydraulic conductivity distribution, areal recharge distribution and temporal variation, and seepage distribution and temporal variation.

April 19 - 23, 1993

Transient model simulations will be performed using calibrated flow model to provide input for contaminant transport model. Graphical presentations of model results will be prepared.

April 24 - May 7, 1993

Develop conceptual model for contaminant transport.

May 8 - 21, 1993

Begin numerical model set-up for MT3D contaminant transport model. Develop input files for MT3D.

May 24 - June 4, 1993

Calibration of MT3D contaminant transport model. Calibration will require iterative adjustment of model input files. Statistical analysis of calibration results will be performed.

June 5 - 18, 1993

Sensitivity analyses will be performed to evaluate model sensitivity to transport parameters. Calibrated model will be used to simulate contaminant transport scenarios to support risk assessment needs. Graphical presentations of transport model results will be prepared including contaminant concentration maps and plots.

June 19 - July 2, 1993

One-dimensional analytical contaminant transport modeling will be performed for transport of contaminants through the colluvium from the seeps to the creeks. Graphical presentations of the results in the form of contaminant concentration plots will be prepared to serve as input for the

OU-2 surface water model.